CMMI: Improving the Acquisition of Defense Systems

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CMMI Technology Conference and Users' Group
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November 14, 2001

Introduction

- CMMI is Important
  - Integration of systems and software engineering is significant
  - Integrated Product and Process Development involves acquirers
  - Integrated appraisal methods are important to the adoption of CMMI
- DoD Will Continue to Support CMMI
  - Through acquisition policy and implementation guidance
  - Through advocacy in technical and acquisition forums
  - Through sponsorship and guidance to the Steward (SEI)

- Adoption and implementation of CMMI promises to provide substantial benefits to both Industry and the DoD

Support for CMMI Development

- OUSD has been a key sponsor of CMMI
  - Sponsors and funds the SEI, the CMMI Steward
  - Member of the CMMI Steering Group
  - Participated in formal piloting of CMMI beginning in December, 1999
- Formal release in 2000
  - CMMI-SE/SW in Aug 2000
  - CMMI-SE/SW/IPPD in Dec 2000
- Co-Sponsored addition of acquisition to CMMI
  - Draft issued for piloting in Dec 2000
  - US Army (Picatinny Arsenal) pilot of CMMI-SE/SW/a in April 2001
  - Trial use of CMMI-SE/SW/IPPD/a in Australia in September 2001
- Directed assessment & evaluation methods be integrated
  - SCAMPI Method Description, Ver. 1.1 will be an integrated Appraisal Method

OUSD (AT&L) Top 5 Goals for Acquisition, Technology & Logistics

1. Achieve credibility and effectiveness in the acquisition and logistics support process.

2. Revitalize the quality and morale of the DoD Acquisition, Technology, and Logistics workforce.

3. Improve the health of the defense industrial base.

4. Rationalize the weapon systems and infrastructure with defense strategy.

5. Initiate high leverage technologies to create the warfighting capabilities, systems, and strategies of the future.

Director, Acquisition Resources and Analysis

- Direct report to Under Secretary of Defense for Acquisition, Technology and Logistics (AT&L)
- Integrate the diverse aspects of Defense Acquisition into a balanced and coherent program that supports the National Strategy and makes the most efficient use of resources.
- Oversee Major Defense Acquisition Program Execution, management, policies and processes
  - DoD 5000 Acquisition Policy Series
- Develop and submit AT&L/DoD Programs and Budgets
- Function as focal point for interface with Congress, GAO, IG, OMB and other external organizations

OUSD(AT&L) ARA Functions

RESOURCE ANALYSIS

Program Objective Memorandum
Defense Planning Guidance
OSD Budget
Strategy and Policy

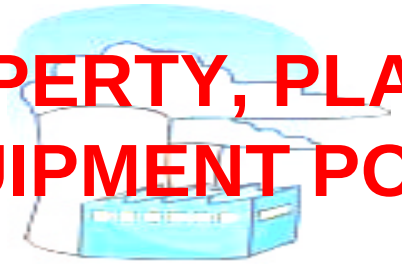
CONGRESSIONAL ACTIONS

Hearings, Bills, Appeals, Inquiries
DoD Inspector General/GAO
Propose Legislation
Secretary of Defense Annual Report

ACQUISITION MANAGEMENT

Defense Acquisition Board
Defense Acquisition Executive Summary
DoD 5000 Acquisition Policy
Earned Value Management Systems
Selected Acquisition Reports
Integrated Digital Environment

OUSD(AT&L) ARA Functions (2)

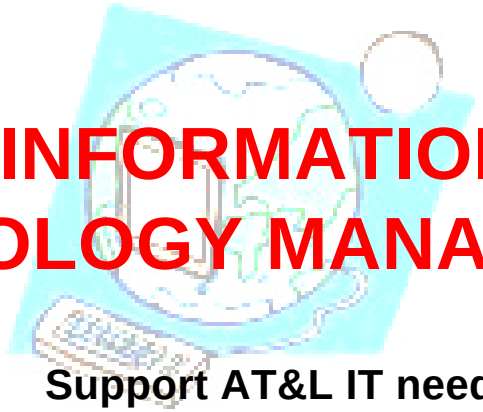


PROPERTY, PLANT & EQUIPMENT POLICY

CFO Audits
Inventory, Materials
Financial Management

STUDIES & FFRDCs

OSD Studies
Oversee 10 FFRDCs
University Affiliated Research Ctr
Oversee OSD Contracted
Advisory & Assistance Services



INFORMATION TECHNOLOGY MANAGEMENT

Support AT&L IT needs
Mobile Computing
DoD IT Policy
Tech Insertion
Executive Support

OUSD(AT&L) ARA Functions (3)

Newly transitioned from DUSD (S&T) in June 2001...

Independent Expert Program Reviews
Software Education and Training
Software Acquisition Best Practices
Defense Software Collaborators
Software Engineering Science & Technology
Software Policy

Software Engineering is Important

- Our warfighters and our support personnel depend on Software Intensive Systems
- In warfighting, software has become the soul of our weapons
  - targeting and weaponeering
  - intelligence gathering, synthesis, and analysis
- Software challenges are formidable
  - System complexity
  - Greater interdependency
  - Huge legacy backlog
  - Growing investment in sustainment
- Software provides the flexibility for capability-based responsiveness

Systems Engineering is Important

- Unprecedented system complexity escalates software issues to system issues
  - Interoperability
  - Systems of systems
  - Network-centric warfare

- Many "software problems" are linked to systems issues
  - Shortfalls in requirements definition often result in software growth
  - Problems often surface too late in the development cycle
  - Testing cycles often used for re-engineering capabilities
  - Complex systems can no longer be segregated into software and hardware
  - Absolute reliance on software for systems integrity demands that systems and software be treated together for process improvement

Acquisition is Important

- System and software problems manifest in acquisitions
- Sustainment considerations make design, development and deployment decisions critical
- Integrated team (acquirer & developer) competencies and capabilities influence system delivery outcomes

CMMI Expected Benefits to DoD

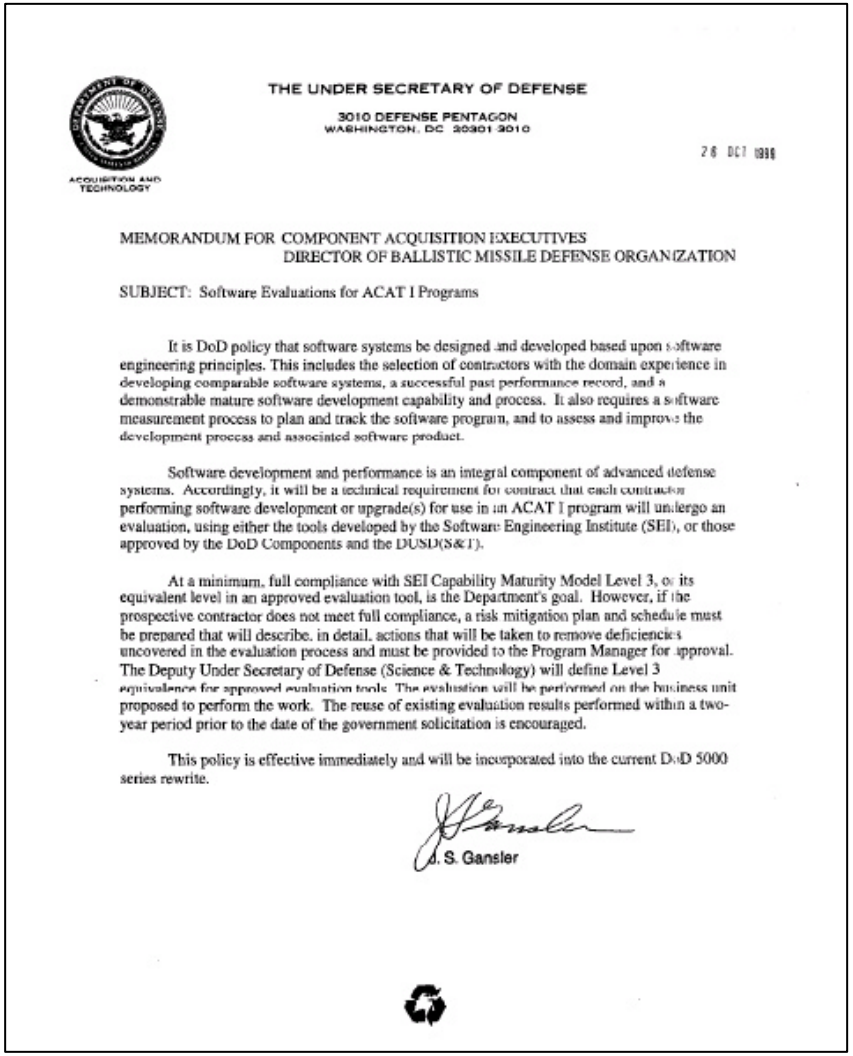
- Better engineering leads to better products (and better acquisition decisions)
  - Software is often blamed for flawed systems engineering and programmatic decisions
  - Common, integrated processes reduce confusion and provide more consistent data for decision making
  - Developers and integrators with mature, integrated processes lead to better engineering

- CMMI represents innovative practice, and DoD 5000.1 states:
  - "*Decision-makers at all levels shall encourage the continuous examination and adoption of innovative practices ... that reduce cycle time and cost, and encourage teamwork…The objective is a learning culture that embraces change*"

CMMI Expected Benefits to DoD (2)

- Integrated Product and Process Development grew out of the acquisition 'community of practice'
  - Evolutionary acquisition requires closer relationships between acquirer and developer
  - CMMI can provide a common framework for improvement
- CMMI can help DoD respond quicker to emerging, unforeseen needs; providing a basis for trust needed for teaming
  - More developers with mature capabilities
  - Better, more agile system designs
  - Higher quality software intensive systems
- CMMI offers a better understanding of the interrelationship among enterprise processes

DoD Policy on CMM, 26 Oct 99



THE UNDER SECRETARY OF DEFENSE

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WASHINGTON, DC 20301-3010

ACQUISITION AND TECHNOLOGY

26 OCT 1999

MEMORANDUM FOR COMPONENT ACQUISITION EXECUTIVES
DIRECTOR OF BALLISTIC MISSILE DEFENSE ORGANIZATION

SUBJECT: Software Evaluations for ACAT I Programs

It is DoD policy that software systems be designed and developed based upon software engineering principles. This includes the selection of contractors with the domain experience in developing comparable software systems, a successful past performance record, and a demonstrable mature software development capability and process. It also requires a software measurement process to plan and track the software program, and to assess and improve the development process and associated software product.

Software development and performance is an integral component of advanced defense systems. Accordingly, it will be a technical requirement for contract that each contractor performing software development or upgrade(s) for use in an ACAT I program will undergo an evaluation, using either the tools developed by the Software Engineering Institute (SEI), or those approved by the DoD Components and the DUSD(S&T).

At a minimum, full compliance with SEI Capability Maturity Model Level 3, or its equivalent level in an approved evaluation tool, is the Department's goal. However, if the prospective contractor does not meet full compliance, a risk mitigation plan and schedule must be prepared that will describe, in detail, actions that will be taken to remove deficiencies uncovered in the evaluation process and must be provided to the Program Manager for approval. The Deputy Under Secretary of Defense (Science & Technology) will define Level 3 equivalence for approved evaluation tools. The evaluation will be performed on the business unit proposed to perform the work. The reuse of existing evaluation results performed within a two-year period prior to the date of the government solicitation is encouraged.

This policy is effective immediately and will be incorporated into the current DoD 5000 series rewrite.

J. S. Gansler

- Contractor selection
  - Domain experience
  - Past performance
  - Mature software process
  - Measurement program
- Evaluation
  - Full compliance with SEI SW-CMM Level 3, or equivalent
  - Risk mitigation plan for deficiencies
  - Equivalent tools approved by DUSD(S&T)
  - Must be performed on business unit proposed to do the work
  - Reuse of evaluation results within a two-year period encouraged

CMMI Policy Strategy

- In the near term....
  - Develop interim guidance to allow use of CMMI as an "equivalent" measure under the current policy
  - Goal is to issue this by January 2002
- Addressing the December 2003 SW-CMM sunset...
  - Evaluate move to CMMI as a single measure
  - Update DoD 5000.2-R policy, as appropriate
- Develop guidance to address other implementation issues:
  - Policy application to subcontractors
  - Use of profiles for 'continuous' representations
  - Government participation on contractor internal assessments
  - Reuse of assessment artifacts, including results
  - Alternative appraisal methods

Can Acquisition Benefit from CMMI?

- System acquirers and developers have a closely linked relationship.
- Acquisition organizations face challenges* amenable to model-based process improvement
  - Policy Conflicts
  - Interoperability Clashes
  - Confused Communication
  - Ineffective Systems Engineering
  - Premature System Deployments
  - Inadequate Resource Infrastructure
  - Disconnected Education & Training
- Assessments of contractors reveal problems with the maturity of acquiring project office capabilities

Source: Recurring Causal Patterns identified by the Tri-Service Assessment Initiative Systemic Analysis

CMMI Evolution

- CMMI will continue to evolve; addressing the needs of those acquiring software-intensive systems
  - Address the total scope of functional disciplines that must be brought together in ‘delivery’ capabilities in an integrated team
  - Ensure greater participation from acquisition-related organizations
  - Seek input from safety and security communities of practice
- Perform cost/benefit analyses of alternative appraisal methods
- Sponsor CMMI transition enablers
  - Mapping to standards
  - Guidebooks for specific domains
  - Implementation and training aids

CMMI is Important

- CMMI is now ready for use:
  - We have been refining and 'piloting' it for two years
  - It is a codification of best practices that are appropriate to guide process improvement efforts.
  - It will continue to evolve to better meet the needs of stakeholders

- DoD will support CMMI through policy, advocacy, and the steward, but...
  - *You* have to adopt and use it
  - *You* have to help show its value empirically
  - *You* have to help improve it

Contact Information

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